Developments in the Stratosphere

May 4, 2015

Stratosphere in Reanalyses

Status at NCEP to improve the stratosphere in reanalysis. *Craig Long, NCEP/CPC*

- Problems with the representation of oscillations
- Satellite bias corrections
- Observation transitions... Jumps
- Performed multiple tests with CFSR
  - Compare SSU Ch3 and AMSU Ch14
  - Ozone and rocketsondes
  - CFSR and 3-year test run match well for the seasonal cycle
- **Understand why problems exist, not how to solve them**

Water Vapor

Water vapor in the stratosphere. *John McCormack, NRL*

- Photochemical P-L (latitude, seasonal, altitude dependence)
  - Help with parameterizations
- Analysis of specific humidity
  - With and without photochemistry
  - Large differences in the upper levels potentially due to the inclusion of spurious data
- **Accurate prognostic humidity in the UTLS can reduce model bias**
- Discussion about quality of the upper level data

Aerosols

Aerosol modeling. *Sarah Lu, SUNY-Albany*

- Motivation for including aerosols
  - Clouds/radiation, improve assimilation, AQ
- Impacts of aerosols on the operational models
- Operational benefits
  - Medium-range forecasting, aerosol-chemistry-climate interactions
- **Prognostic aerosol capabilities**
- Trajectory analysis related to volcanoes

Aerosols

Aerosol Reanalysis at NASA Goddard. Arlindo da Silva

- Aerosols are underdetermined
- Observing systems
  - Lidar, ground-based (aeronet), satellite retrievals
- MERRAero (2002 – present)
  - Good comparison with aeronet
  - Also evaluated with OMI
- Radiative effects of different species
- Regional climatology of PM2.5 in CONUS
  - Discussion of differences in PM2.5 in winter months in NW and SW
  - Uncertainties in observing PM2.5
- New model to resolve mass and number concentration
- **MERRA2 first to integrate aerosols**

Discussion

- Discrepancy in the PM2.5 in winter months (in reference to the da Silva figure)
  - Weak nitrate signal due to drop-off of agriculture and biomass burning
- Do we need better modeling or better observations in the stratosphere?
- Advantages of having model top at 0.01 hPa (compared to 0.2 hPa)?